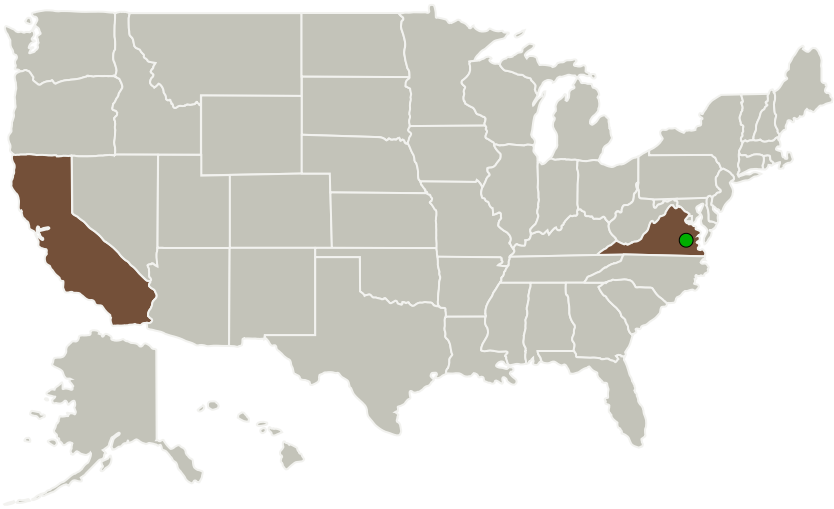
# Energy Production for Sustainable Planetary Explorations, Phase I

Completed Technology Project (2011 - 2012)

## Project Introduction

Our basic approach is to use a photoelectrochemical cell operated under simulated Mars conditions. The light source will be solar simulator with a wide spectrum of emitted light. On Mars wavelengths of light down to 190 nm reach the surface (compared to Earth where only 300 nm and above reaches the surface). The soil will be the JSC.Mars 1 stimulant which is known to contain 10% TiO2 (in partial reduced forms) and is supposed to be a good analog for the surface soils on Mars. We will consider two possible sources of H2O: first water flowing as liquid from below the surface of the soil and second water deposited as condensate on the surface of the soil. Additional two types of photocatalysts will be evaluated for methane conversion efficiencies: off shelf low cost TiO2 (P25), and doped TiO2 nanostructures (nanotubes and nanowires) for broader solar wavelength absorptions.

## Primary U.S. Work Locations and Key Partners

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| Organizations Performing Work | Role | Type | Location |
|---|---|---|---|
| LC Tech | Lead Organization | Industry<br>Minority-Owned Business, Women-Owned Small Business (WOSB) | Palo Alto, California |
| Langley Research Center(LaRC) | Supporting Organization | NASA Center | Hampton, Virginia |
| University of Southern California(USC) | Supporting Organization | Academia | Los Angeles, California |

| Primary U.S. Work Locations | |
|---|---|
| California | Virginia |

## Project Transitions

**February 2011:** Project Start

**February 2012:** Closed out

**Closeout Documentation:**

- Final Summary Chart*(https://techport.nasa.gov/file/138979)*

## Organizational Responsibility

**Responsible Mission Directorate:**

Space Technology Mission Directorate (STMD)

**Lead Organization:**

LC Tech

**Responsible Program:**

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

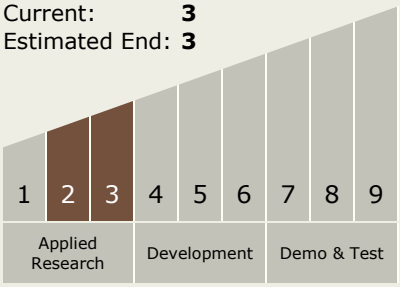
Carlos Torrez

**Principal Investigator:**

Jinbo Yang

## Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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## Technology Areas

**Primary:**

- TX07 Exploration Destination Systems
  - TX07.1 In-Situ Resource Utilization
    - TX07.1.2 Resource Acquisition, Isolation, and Preparation

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System